

THAT WHICH IS CLAIMED IS:

1. A DC-to-DC converter comprising:
 - at least one power switch;
 - a pulse width modulation circuit for generating control pulses for the at least one power switch;
 - 5 an output inductor connected to the at least one power switch;
 - a thermally compensated current sensor connected to the output inductor for sensing current in the output inductor, the thermally compensated current
 - 10 sensor having a temperature coefficient that substantially matches a temperature coefficient of the output inductor; and
 - a current feedback loop circuit cooperating with the pulse width modulation circuit for controlling
 - 15 the at least one power switch responsive to the thermally compensated current sensor.
2. A DC-to-DC converter according to Claim 1 wherein the at least one power switch comprises at least one field effect transistor.
3. A DC-to-DC converter according to Claim 1 wherein the at least one power switch comprises a low side field effect transistor and a high side field effect transistor connected together.
4. A DC-to-DC converter according to Claim 1 wherein the at least one power switch comprises a low side power switch and a high side power switch connected together.

5. A DC-to-DC converter according to Claim 1 wherein the thermally compensated current sensor is connected in parallel with the output conductor and comprises a resistor and a capacitor connected in series.

6. A DC-to-DC converter according to Claim 5 wherein the resistor of the thermally compensated current sensor comprises a positive temperature coefficient resistor.

7. A DC-to-DC converter comprising:
at least one power switch;
a pulse width modulation circuit for generating control pulses for the at least one power switch;
5 an output inductor connected to the at least one power switch;
a thermally compensated current sensor connected to the at least one power switch for providing a sensed current related to a current being conducted
10 through the output inductor, the thermally compensated current sensor having a temperature coefficient that substantially matches a temperature coefficient of an on-state resistance of the at least one power switch;
15 a current feedback loop circuit cooperating with the pulse width modulation circuit for controlling the at least one power switch responsive to the thermally compensated current sensor.

8. A DC-to-DC converter according to Claim 7 wherein the at least one power switch comprises at least one field effect transistor.

9. A DC-to-DC converter according to Claim 7 wherein the at least one power switch comprises a low side field effect transistor and a high side field effect transistor connected together.

10. A DC-to-DC converter according to Claim 7 wherein the at least one power switch comprises a low side power switch and a high side power switch connected together.

11. A DC-to-DC converter according to Claim 7 wherein the thermally compensated current sensor is connected between the at least one power switch and the current feedback loop circuit, and the thermally
5 compensated current sensor comprises a resistor.

12. A DC-to-DC converter according to Claim 11 wherein the resistor of the thermally compensated current sensor comprises a positive temperature coefficient resistor.

13. A multiphase DC-to-DC converter comprising:
at least first and second channels each
comprising

5 a power device including a low side power switch and a high side power switch connected together,

a pulse width modulation circuit for
generating control pulses for the power device;
an output inductor connected to the power
10 device,
a thermally compensated current sensor
connected to the power device for providing a
sensed current related to a current being
conducted through the output inductor, the
15 thermally compensated current sensor having a
temperature coefficient that substantially
matches a temperature coefficient of an on-state
resistance of the low side power switch,
a current feedback loop circuit cooperating
20 with the pulse width modulation circuit for
controlling the power device responsive to the
thermally compensated current sensor.

14. A multiphase DC-to-DC converter according to
Claim 13 wherein each of the power switches comprises
a field effect transistor.

15. A multiphase DC-to-DC converter according to
Claim 13 wherein the thermally compensated current
sensor is connected between the power device and the
current feedback loop circuit, and the thermally
5 compensated current sensor comprises a resistor.

16. A multiphase DC-to-DC converter according to
Claim 15 wherein the resistor of the thermally
compensated current sensor comprises a positive
temperature coefficient resistor.

17. A multiphase DC-to-DC converter comprising:
at least first and second channels each
comprising

- 5 a power device including a low side power
switch and a high side power switch connected
together,
- a pulse width modulation circuit for
generating control pulses for the power device;
- an output inductor connected to the power
10 device,
- a current sensor connected to the power
device for providing a sensed current
proportional to a current being conducted
through the output inductor,
- 15 a current feedback loop circuit cooperating
with the pulse width modulation circuit for
controlling the power device responsive to the
current sensor; and
- a feedback resistive network connected between
20 an input of the pulse width modulation circuit of
each of the at least first and second channels and
the output terminal, and comprising a negative
temperature coefficient resistor having a temperature
coefficient that substantially matches a temperature
25 coefficient of an on-state resistance of the low side
power switch of the power device of the at least
first and second channels.

18. A multiphase DC-to-DC converter according to
Claim 17 wherein each of the power switches comprises
a field effect transistor.

19. A method of regulating a DC-to-DC converter comprising at least one power switch, a pulse width modulation circuit for generating control pulses for the at least one power switch, an output inductor
5 connected to the at least one power switch, and a current feedback loop circuit cooperating with the pulse width modulation circuit for controlling the at least one power switch, the method comprising:
sensing current passing through the inductor
10 using a thermally compensated current sensor connected to the output inductor, the thermally compensated current sensor having a temperature coefficient that substantially matches a temperature coefficient of the output inductor; and
15 operating the current feedback loop circuit to control the at least one power switch in response to the thermally compensated current sensor.

20. A method according to Claim 19 wherein the at least one power switch comprises at least one field effect transistor.

21. A method according to Claim 19 wherein the at least one power switch comprises a low side field effect transistor and a high side field effect transistor connected together.

22. A method according to Claim 19 wherein the thermally compensated current sensor is connected in parallel with the output conductor and comprises a resistor and a capacitor connected in series.

23. A method according to Claim 22 wherein the resistor of the thermally compensated current sensor comprises a positive temperature coefficient resistor.

24. A method of regulating a DC-to-DC converter comprising at least one power switch, a pulse width modulation circuit for generating control pulses for the at least one power switch, an output inductor
5 connected to the at least one power switch, and a current feedback loop circuit cooperating with the pulse width modulation circuit for controlling the at least one power switch, the method comprising:

providing a sensed current related to a
10 current being conducted through the output inductor using a thermally compensated current sensor connected to the at least one power switch, the thermally compensated current sensor having a temperature coefficient that substantially matches a
15 temperature coefficient of an on-state resistance of the at least one power switch; and

operating the current feedback loop circuit to control the at least one power switch in response to the thermally compensated current sensor.

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25. A method according to Claim 24 wherein the at least one power switch comprises at least one field effect transistor.

26. A method according to Claim 24 wherein the at least one power switch comprises a low side field

effect transistor and a high side field effect transistor connected together.

27. A method according to Claim 24 wherein the thermally compensated current sensor is connected between the at least one power switch and the current feedback loop circuit, and the thermally compensated
5 current sensor comprises a resistor.

28. A method according to Claim 27 wherein the resistor of the thermally compensated current sensor comprises a positive temperature coefficient resistor.